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States, a field now occupied by Dr. Gray's and Professor Wood's manuals. It is to be hoped that Dr. Kellerman's second book will be a less verbatim compilation than his first has been.

BOTANICAL NOTES.—We have examined Professor Groff's Plant Analysis, published by the Science and Health Publishing Company of Lewisburg, Pa., and can commend it to those who wish a cheap and yet good help of this kind.——Dr. Farlow, in the March *Botanical Gazette*, makes a number of interesting additions to his previous list of Peronosporeæ.——In a recent number of *Nature*, Dr. Schweinfurth contributes an interesting paper on the flora of ancient Egypt. As is well known, the funeral wreaths preserved in the mummy cases have been objects of study by botanists for some time, and through these we now know much as to the common plants of the Nile region thirty to thirty-five centuries ago. The evidence as obtained shows that some important migrations have taken place during the time which has elapsed since the wreaths were gathered. On the other hand, there is evidence that some plants have, through this long period, preserved not only their places in the flora, but their specific and varietal characters as well.——The last part (No. 7, Algæ) of the new edition of Rabenhorst's Kryptogamen Flora brings Dr. Hauck's work up to the Phæozoösporeæ.——It gives us great pleasure to learn that the New York Agricultural Experiment Station has secured the services of Professor J. C. Arthur, who is to be the station botanist. The director of the station is to be congratulated upon his wise selection, which is an indication that *plant life*, rather than *plant names*, shall receive the greatest attention of the station.——Thomas Hick, in the March *Journal of Botany*, concludes his paper on protoplasmic continuity in the Florideæ. He says in conclusion, after having examined many species of widely different genera, "It seems clear that, if not universal, protoplasmic continuity is very widely distributed in the Florideæ," and further on, in explanation of this phenomenon, "The process of cell-division appears never to proceed so far as to completely separate the different portions of a divided protoplasmic body, so that they remain connected together by one or more threads of protoplasmic material."

ENTOMOLOGY.

GILLS OF INSECT LARVÆ.—In an article on this subject in *Psyche* (IV, 110, 1883), Professor G. Macloskie states that it is usual to describe the laminæ of the pneumatic gills as containing systems of fine tracheal loops, somewhat after the pattern of a plurality of carbon-wicks in an Edison lamp. In a specimen, however, of the rectal branchiæ of the larval Libellula, which he rolled under the cover-glass, he found that the multitude of tracheal ramifications ended cœcally; all were of about the same length, their extremities recurved within the containing sac, and their tips not at all swollen, but rounded off. "As they are elastic, and the closing sac distensible, we think it highly probable that with each water-inspiration the sacs enlarge and the tracheal spray (having air forced in by the forward compression of the large tracheæ) spreads out so as to bring the full tide of air close to the tide of water. Léon Dufour, seems to have had some process like this in view, when he said that each lamella of the branchia of Potamophilus is 'probably swollen during life by air transmitted by endosmosis.' As we understand the case, the air is injected into the branchiæ from the rest of the body by rhythmical contractions, and its gases then communicate endosmotically with those in the tidal waters, so as to secure renovation." The action of the tracheæ, Macloskie believes to be tidal rather than due to peripheral capillary circulation; there being a flux and reflux, rather than a mere circulation of the air.

THE CLOSED POISON GLANDS OF CATERPILLARS.—Dr. Dimmock, in the course of a valuable article "on some glands which open externally on insects," in *Psyche*, for "Sept., Oct., 1882" (published in Feb., 1884!), states, that if a Cecropia caterpillar "be examined carefully, the black spines upon its red, blue, and yellow knobs, or tubercles, will be seen to break easily from the tubercles, and a clear, yellow fluid of disagreeable odor to ooze from each opening left by the injury. By crushing the tubercle with a pair of forceps, the same strong odor is very noticeable, and by this mode of treatment one has no difficulty in proving that each tubercle, small or large, blue, yellow, or red, contains the odorous fluid. The red tubercles are seen, in sections cut with the microtome, to be divided into compartments, the cavities of each spine opening into a compartment at its basal end. The spines themselves are quite rigid and very brittle, so that they break away at a slight touch and leave a hole in the tubercle, out of which the odorous fluid pours, pushed by internal pressure. This fluid, which I have not examined carefully, but which I hope later to study chemically, is strongly acid to litmus paper, but causes a purple precipitate in carmine solution." The odor given out by these glands suggests at once their protective function. Similar glands, *i.e.* with no outlet until one is produced by external agency, are not rare in Bombycid larvæ. Karsten, in 1848, described the anatomy of the poison glands at the base of the hairs of an American Saturnia. The secretion is "perhaps formic acid or a formate in solution." The paper is crammed with interesting facts on this subject. Among others it is stated that, according to Witlaczil, the "honey" secreted by the Aphides issues from the anus and not from the tubes on the sixth segment.

THORACIC MUSCULATURE OF INSECTS.—C. Luks has investigated the thoracic musculature of insects of every group, except the Thysanura and Collembola. He finds, according to the Journal of the Royal Microscopical Society, that the wing-muscles appear to have developed along two lines; in one, the indirect flying muscles were almost completely aborted, while in the other they were developed at the expense of the direct muscles. In close connection with the development and modification of these muscles is the extent of concentration of the rings of the thorax and the size of the wings. In the Orthoptera all the three segments of the thorax are freely movable on one another, while in the Coleoptera only the prothorax is so movable. In the Lepidoptera the prothorax loses its mobility, though retaining its distinctness, while in the Diptera and Hymenoptera the whole region is converted into a firm thoracic apparatus, to which, in the latter, the first abdominal segment also becomes applied. As Graber has shown, we observe that in insects which by other points in their organization intimate that they are more highly developed, one pair of wings tends to become aborted, as is seen in the Coleoptera, Diptera, and even Lepidoptera, where the hinder pair of wings often become united with and share in the movement of the anterior pair.

RESPIRATORY CENTER OF INSECTS.—According to Dönhoff, the respiratory center in the bee is situated in the anterior ganglia, and therefore the respiratory movements are put an end to by decapitation. Dr. O. Langendorff, from his investigation, finds that in the bee, wasp, and other insects, the respiratory movements are not destroyed by removal of the head, especially when by *tearing*, and not *cutting* it off, a great loss of blood is avoided, the respiratory movements show the same increased rapidity with a high temperature, slowing with a low temperature in the headless insect as in the uninjured insect.

A number of experiments were also made upon *Libellula depressa* and other insects belonging to the Pseudoneuroptera, in which group the segmentation of the body is very marked in correspondence with their ancestral type; in these insects the respiratory center is not merely not localized in the head, but each segment is a complete center in itself, being capable of respiratory movement, when entirely isolated. "A better example to illustrate the physiological metamerism of the insect body can hardly be imagined; each segment with its ganglion is a physiological unity!" The results of a great number of observations are fully stated in the paper, and several diagrams are given of tracings obtained of the respiratory movements.—*Journ. Roy. Mic. Society, February.*

MOUTH-PARTS OF THE HEMIPTERA.—O. Geise regards the flattened or more or less curved process of the clypeus of the Rynchota as the homologue of the labrum of beetles; the jointed groove corresponds to the labium, the two separable setæ to the mandibles, and the two setæ, only with difficulty separable, to the maxillæ of biting insects. He next considers the structure which Savigny regarded as the lingula, but to which most authors have applied Burmeister's name of "Wanzen-platte;" he himself proposes to speak of it as the pharynx, and describes it as being endowed with great elasticity, and as acting as a pump, which is set in action by the contraction of muscles attached to the body-wall, whereby the space in the walls in which they are inserted is enlarged, and a vacuum thereby formed. The structure and relations of these parts are entered into in great detail, but, says the Journal of the Royal Microscopical Society, a full abstract of the paper would be impossible without a republication of the figures to which constant reference is made. The essay should receive the careful study of students of the anatomy of insects.

CHLOROPHYLL IN APHIDES.—L. Macchiati, having noticed that certain Aphides, when placed in a dark situation, lost their color in the same way that leaves do, investigated two species, *Siphonophora malvæ* and *S. rosæ*, with a view of ascertaining whether they contained chlorophyll; he discovered, by applying the usual test, that chlorophyll was undoubtedly present. The objection that this substance is absorbed from plants by the insects, and not elaborated in their own bodies, is met by the statement that it is also to be found in those species that live upon the colored petals of flowers. The conclusion arrived at needs to be confirmed "by a more matured study," and M. Macchiati promises a fuller investigation of this interesting discovery.—*Journal of the Royal Microscopical Society.*

AYERS' DEVELOPMENT OF ŒCANTHUS NIVEUS AND ITS PARASITE, TELEAS.—This is an extended, thorough, and well illustrated memoir on the embryology of the tree cricket, and its egg parasite, by Howard Ayers, a student of Professor E. L. Mark, at Cambridge, Mass. It received the Walker prize of the Boston Society of Natural History, in whose memoirs it appears, under date of January, 1884, forming a brochure of 56 pages, with eight plates and woodcuts in the text. Mr. Ayers endeavors to establish the following points in the embryology of Œcanthus:

1. The origin of the ovum in a germarium rather than from an ovarian epithelium.
2. The process of yolk formation by cell-degeneration instead of secretion.
3. The occurrence of a primitive segmentation of the embryo before the appearance of the permanent segments.
4. The existence of a pair of appendages (some of them rudimentary [deciduous]) on each of the seventeen segments of the body.
5. The origin of the dorsal vessel as a paired organ, the lateral halves of which fuse and give rise to a median tube in the same

manner as in some of the worms, and the origin of the blood corpuscles as nucleoli of endodermic cells.

6. The existence of embryonic gills.

7. The lack of any sharp distinction between a cell and its nucleus, and between a nucleus and its nucleolus.

8. The existence of segmental enlargements of the mesodermic somites, similar to those from which the nephridia of worms take their origin.

9. The origin and significance of the embryonal membranes among the insecta.

10. The origin and significance of the dorsal organ among the insecta.

Among the chief points of interest is the mode of formation of the blastoderm. No nucleus was observed in the fertilized eggs, even in those which had been only laid from one to twenty-five minutes; and in the ovarian egg after the disappearance of the germinative vesicle no traces of nuclei were to be found. When the blastoderm is partially formed, however, there are always numerous amœboid cells to be found throughout the yolk. These nuclei form the blastoderm in the following manner: the pseudopod-like processes sent out by a few of those migrating to the surface of the yolk fuse together, and furnish by rapid division a sufficient number of cells to form the blastodermic membrane. This mode is the same as observed by Bobretsky in the Lepidoptera. There is no segmentation of the yolk.

The fact that at first the embryo is composed of four well-marked regions, which the author designates as the "cephalic, maxillary, thoracic, and abdominal," is interesting. The author does not attempt to compare this feature with the earliest stage of the spider with its protozonites, as discovered by Claparede, but the resemblance is at least a striking one.

The process of turning of the embryo is clearly described and figured. After giving a summary of the development, attention is next directed to the mode of formation of the different organs. The novel points worked out are the origin of the heart and the discovery of so-called gills, and the relations of the germinal layers.

The formation of the heart begins after the revolution of the embryo; it is first to be distinguished in the abdominal region about the time of the closure of the dorsal ectoderm. "In the formation of the heart, the lateral plates of mesoderm grow upward around the mesenteron, and as their edges approach the median dorsal line there is seen to be in each a tube. These two plates coalesce in the median line, and their tubes unite into one—the heart, or dorsal vessel."

The discovery of the "gills or respiratory organs" which Mr. Ayers describes is rather startling. A pair of lateral outgrowths arise from the ectoderm of the pleural region of the first abdominal segment, and "come to lie just behind but dorsad of the base of the third thoracic appendage." The internal cavities of each gill "are continuous with the body-cavity, and probably serve as channels through which the vascular fluid circulates." In sections of the gill-organ before becoming atrophied or absorbed, both distinct canals and lacunar spaces radiate from the point of connection of the pad with the body; "and these, together with the arrangement of the cells, give the radiate structure characteristic of the fresh gill." "The gill pad is essentially a single-layered sac, with a much constricted neck, evaginated from the pleural region of the abdomen." It should be observed that these are not tracheate gills, as they contain no tracheæ. Mr. Ayres does not speculate as to their origin.

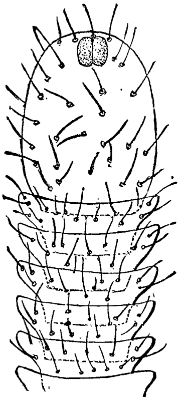
While not accepting Balfour's interpretations and general conclusions as to the origin and significance of the primitive germinal layers among the insecta, Mr. Ayers confesses himself still in doubt as to their origin. But, he adds, "when we consider the rôle and subsequent fate of these two layers, it at once becomes apparent that such a view does not accord with the facts, for the blastoderm ultimately forms the entoderm (mesenteron), and the ectoderm, arising from a small area of thickened cells on one side of the blastoderm, encloses the yolk and endoderm by a genuine epiboly." With some hesitancy he then proposes an explanation which may apply to the Orthoptera: "How did the embryonic membranes (amnion and serosa) arise? What is their function? Is their present function the primitive one? The answer to these inquiries undoubtedly lies in the clear comprehension of the relations of the embryo to its food supply—the yolk. That the cellular embryonic membranes could have originated for protection, or from an early ecdysis, is, to say the least, highly improbable. Among the insecta the egg is furnished with a *protective membrane*—usually in the form of a chorion—before leaving the body of the parent. Omitting the interesting and original explanation in full, the result is that "in Œcanthus the membranes fuse at or near the head, and by a self-eversion through the opening caused by their rupture the embryo comes to lie outside of the amnion and serosa. The latter now forms a yolk sac, which, by a gradual contraction, as the yolk is absorbed, comes to lie within the body, being last seen just back of the head. It is always in connection with the mesenteron, and its thick walls finally disappear by a process of disintegration." The author thinks that in many, if not all, insects, the serosa and amnion play the same rôle that they do in Œcanthus, *i. e.*, "the serosa functions as a yolk sac, while the amnion is the dorsal wall of the insect. Hence the so-called dorsal organ is but the remnant of the yolk sac."

It is interesting to compare the history and function of the serosa and amnion in two branchiate Arthropoda (Limulus and Apus), in which, Limulus at least, the serosa does actually become what we have called a "vicarious chorion," and after the chorion or egg-shell splits, becomes a protective membrane.[1]

Mr. Ayers' observations on the egg-parasite, Teleas, are full and valuable, showing, as he claims, the absence of embryonic membranes, and the occurrence of a larval form intermediate between the blastosphere and the cyclops larva of Ganin.

The illustrations are admirably clear, but the plates are too much crowded; this, however, is not the fault of the author.

A POSSIBLE SENSE ORGAN IN CAMPODEA.—Several years ago, when studying Campodea, I found on the terminal joint of the antennæ what may prove to be a possible sense organ. On the tip of this joint is a body closely resembling a couple of beans placed side by side and supplied by the tip of the antennal nerve. The general relations are shown in the accompanying figure. I regret that I have no further observations which would tend to show the histology or functions of this organ. I mention it at this time to call the attention of others to it, in the hope that our knowledge of it may be increased.



My reason for supposing it a sense organ are the way in which it is supplied with nerves and also its general resemblance to what Dr. Packard has considered as sense organs in the caudal stylets of Chrysopila and the palpi of Perla.

A further feature which may here be mentioned is the power which Campodea has of retracting its antennæ. Ordinarily they are extended to their full length, and then present a moniliform appearance. The insect can, however, by the action of appropriate muscles, so draw the joints into each other that they present the appearance shown in my figure. I have noticed a similar capacity in Scolopendrella.—*J. S. Kingsley, in Science Record.*

LUCILIA MACELLARIA INFESTING MAN.—A farmer's wife, thirty-five years of age, was attacked on Monday, September 27, 1875, with a headache and a flushed face. She stayed at work, expectting a malarial chill, an affection prevailing at that time in the neighborhood. From this time the pains in the region of the frontal cavity, at the base of the nose and below the eye, extending to the right ear, increased. At times the pain was more severe than at others, but it never entirely left. This pain was described as preventing hearing and breathing, and so excruciating that at intervals, day and night, her cries could be heard at a great distance from the house. Tuesday evening blood mucus began to run from the right nostril, which was somewhat swollen, the swelling extending on Tuesday over the whole right side of the face. On this day, the fifth of the complaint, four large maggots dropped out of the right nostril. When I was first called to the patient, Monday, October 4, only the right lip and nostril were swollen, the acrid discharge having somewhat blistered the lips below. After each discharge the maggots dropped from the nostril, until the twelfth day; one hundred and forty or more maggots having escaped. The majority of the maggots were three-fourths of an inch in length, there being only a few which seemed a line or two shorter; they were of a yellow hue, conical shape, and having attached to one end two horn-like hooks. The patient recovered fully.

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[1] See The Development of Limulus polyphemus. By A. S. Packard, Jr. Mem. Bost. Soc. Nat. Hist., March, 1872, p. 160, 161.

Monday, September 18, 1882, I saw a patient in the same neighborhood as the first, suffering from the same malady. At that time two hundred and eighty maggots had been discharged, and at the close of the illness, over three hundred. There was a swelling on each side of the nose, with a small opening to each. I lanced these openings, and more maggots came out.

In the Indian Territory the so-called screw-fly laid its eggs in the nose of man. In 1847, I heard of several deaths of men and children in Texas, near Dallas. The gad-fly was common in the American bottom forty years ago. It laid its eggs in the noses of cattle, and in the ears of horses and deer, but never in the human nose. The fly that I send is about four times as large as the common fly. Head a dark, glistening green; a bronze face, very lively in appearance. Is it the same that they called in Texas or Indian Territory the screw-fly? or is it the gad-fly seeking a new field?

The patient of 1875 is now alive and well. The second case occurred two years ago, near Collinsville, in this country, and proved fatal. The third patient, above named, is getting well. The fourth is reported from Georgia; the patient died.

The first case which I had in my charge was the first which ever occurred here. The eggs must have been deposited in the nose several days before the fifth, the day the maggots dropped out. On the eleventh day all were discharged. I secured live maggots at that time, September 18, 1882. I put soil in an open-mouthed vial and dropped the maggots on it; they crawled in the ground in about five minutes. I covered the opening with white damastis, and hoped that the next year the fly would come out of the ground. But on October 6, or the twentieth day, the vial had fourteen living flies. So, reckoning from six days before the pain commenced for the laying of the eggs, to the twelfth day, when the maggot discharged, making eighteen days, and to this adding the twenty days during which the grubs were in the ground, we have thirty-eight days from the time the fly laid the eggs until a new generation of flies is produced from them.

You may think I have dwelt too long on these cases; but if you had to stand at the bed and had seen the suffering and despair of the patients, and found that the worms were eating them up, you would not think so. All these cases occurred in the month of September.—*Fred. Humbert, M. D., F. C. S.*

[Upon this communication Dr. C. V. Riley says, that the insect here referred to as attacking a human subject in Illinois, "is the *Lucilia macellaria* of Fabricius, the injuries of which to different animals are well known in the South and West, where the larva is called the 'screw-worm.' I have repeatedly endeavored to obtain the true parent of this worm. Dr. Humbert's communication is most interesting, but the specimens yet more so, as the flies he forwards are the first that have positively been bred from the larvæ known as 'screw-worms,' and they confirm the above determination of the species. The larvæ agree with others which I have from Texas, taken from the root of the ear of a hog which had been bitten by a dog."]—*Proc. U. S. Nat. Mus., Sept., 1883, p. 103.* Compare also Professor F. S. Snow's article in *Psyche*, Mar., Ap., 1883, and S. W. Williston in *Psyche*, Nov., Dec., 1883. —EDS. NATURALIST.

ENTOMOLOGICAL NOTES.—G. W. and E. G. Peckham have published in the Proceedings of the Davenport Academy of Sciences detailed descriptions of twenty-five species of spiders of the family Attidæ, illustrated by three rather rude photo-lithographic plates. The authors, who live in Milwaukee, are engaged upon a monograph of this family, and desire specimens of the group from all parts of the continent; they have made a good beginning and should receive aid from all quarters.——An account of the transformations of *Aglossa pinguinalis* by the late W. Buckler, appears in the *Entomologists' Monthly Magazine*, for February. So far from living on fatty substances, as stated by Rolander, which led Linnaeus to give it its specific name, Buckler states that it lives in comparative darkness, in stables, barns, and out-houses, in masses of rubbish, hidden within a protecting sheath or galley nearly or quite close to the ground, composed of materials in which they find both their food and their covering; "unless disturbed, they are never to be seen whilst growing, as they do not voluntarily leave their abodes until full-fed; but then only do they desert their quarters, and may occasionally be observed ascending walls to find a suitable place for pupation."

ZOOLOGY.

ATAVISM CONSIDERED AS A CONSERVATIVE AGENT IN A STATE OF NATURE.—Atavism, although a very important factor in the preservation of species, receives but little of the recognition it deserves as such; because its action in nature is not superficially apparent enough to command attention and observation, and so, though ancient in name as well as existence it may still, as far as practicable observation goes, and to all intents and purposes